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March 12, 2015

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Via Overnight Federal Express

The Honorable David Small
Secretary, Department of Natural Resources and Environmental Control
Richardson & Robbins Building
89 Kings Hwy
Dover, DE 19901

Re: Bloom Energy

Dear Secretary Small:

Thank you for the opportunity to expand upon the discussions of January 22, 2015, between you and your staff and representatives of Bloom Energy (Bloom or the Company). Specifically, we discussed the application of the Manufacturing Process Unit (MPU) exemption, and other Resource Conservation and Recovery Act (RCRA) and Delaware Hazardous Waste Management law exemptions and qualifications, to the desulfurization canister units (Desulf Units) which are a component of Bloom Energy servers used to make electricity. This letter and accompanying materials provide support for Bloom Energy's conclusion that the contents of the Desulf Units are regulated as waste no earlier than when the Units are opened for maintenance and replacement and/or recycling of the residue they contain. Neither the U.S. Environmental Protection Agency (EPA) nor any State has ever taken a position contrary to this conclusion.

Several questions you and your staff raised during and subsequent to our January meeting, that do not bear directly on the application of the MPU exemption, have been and/or will be answered in separate communications.

<sup>&</sup>lt;sup>1</sup> This letter makes frequent references to the federal Resource Conservation and Recovery Act and regulations adopted thereunder. In all respects material to this letter, the federal provisions were adopted verbatim by Delaware in the implementation of the Delaware Hazardous Waste Management law, 7 Del. Code Chapter 63, and particularly the regulations thereunder. Since June 22, 1984, Delaware has had delegated primary responsibility for implementing the RCRA hazardous waste program within the State. The legal arguments contained in this letter have been reviewed and are joined in by Bloom Energy's Delaware counsel.

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Bloom Energy Servers<sup>TM</sup> (Servers) (pictured in Enclosure 1) are sited at and provide power to federal and state facilities, as well as to private sector facilities in more than 200 locations across 11 states. Moreover, as will be set out in more detail in this letter, once Bloom's Desulf Units are removed from operation in Delaware, as in other states, they are promptly moved to facilities in Texas, where they are opened, emptied, cleaned and refilled before being returned to Bloom to be reused.<sup>2</sup> We believe that, with the further information and analysis provided in this letter, DNREC will conclude that removal of the Desulf Units from service does not constitute generation of a waste unless and until the Desulf Units are opened, provided this occurs within 90 days of removal from service.

# I. Introduction to Bloom Energy

Bloom Energy was founded in 2001, in Sunnyvale, California, by Dr. K.R. Sridhar, who has graduate degrees in nuclear engineering and mechanical engineering, and who spent many years working with NASA developing a technology to convert atmospheric gases on Mars to oxygen usable for propulsion and life support. In connection with this work, Dr. Sridhar built a fuel cell that uses electricity generated by a solar panel to produce air and fuel. After concluding his work for NASA, Dr. Sridhar decided to apply his expertise to our own planet—developing a technology for producing clean, reliable, affordable electricity here on earth, with minimal impact on the environment. This is Bloom Energy.

Bloom's Servers produce electricity using an innovative solid oxide fuel cell technology created by Dr. Sridhar and his colleagues at Bloom, to convert natural gas or biogas into electricity. The result is among the most efficient electricity generators available, with significantly reduced greenhouse gas and criteria pollutant emissions.

Starting with its first Servers installed commercially in 2008, Bloom's Servers now produce electricity at more than 200 customer sites, ranging from commercial customers (i.e., Apple, eBay and Verizon), utilities (Delmarva Power, Pacific Gas & Electric) and universities (Caltech), to government facilities (New York City Hall, NASA, and strategic Department of Defense facilities).<sup>3</sup>

In May of 2013, Delaware became an important center of Bloom Energy's manufacturing operations when the Bloom Energy Manufacturing Center opened in Newark to complement Bloom's facilities in Sunnyvale, California. As Bloom's founder and CEO, Dr. Sridhar, explained during the inauguration of the Delaware Manufacturing Center, Bloom's on-site

<sup>&</sup>lt;sup>2</sup> In the past, refilling operations were handled at the Texas facilities, but Bloom is currently transitioning the refilling of all empty canisters to Delaware.

<sup>&</sup>lt;sup>3</sup> Bloom Energy anticipates introducing a smaller Server for residential use in the US. These will use the technology, including the desulfurization process, described in this letter.

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power generation systems manufactured in Delaware produce clean, reliable electricity, using a highly efficient and environmentally superior non-combustion process.

# The Bloom Energy process generates electricity with a substantially reduced environmental footprint compared to traditional energy sources.

- Reduced GHG Emissions: Bloom's Servers convert natural gas or biogas into electricity through an electrochemical reaction without combustion. The result is a dramatically lower air emission profile in comparison to combustion-based power generation. The Servers can generate electricity starting at above 60% efficiency (lower heating value of gas to A/C power), representing an approximately 50% reduction in carbon dioxide in comparison to the US grid. When operating on biogas derived from waste streams, the Servers generate carbon neutral electricity. Additionally, as a distributed resource, Bloom Energy Servers avoid the losses associated with the transmission and distribution of electricity from centralized resources, representing an additional 6%+ increase in efficiency in comparison to the US Grid.<sup>5</sup>
- Reduced Criteria Pollutants: By virtue of the non-combustion process, Bloom's Servers virtually eliminate NOx, SOx, CO, VOCs, and particulate matter emissions from the energy production process. Thus, Bloom Energy Servers can be strategically sited into dense areas of the grid without impacts to public health that would come with some other distributed power sources.
- Reduced Water Use: The Servers consume no water during normal operation, as compared to thermoelectric plants, which make up 49% of water withdrawals in the US.<sup>6</sup>
- <u>Improved Water Quality</u>: The Servers do not discharge any water, eliminating the threat posed by other technologies to water supplies, aquatic ecosystems, fisheries and health.
- Reduced Land Use and Noise Impact: The Servers require little space and produce very little noise.<sup>7</sup>

<sup>&</sup>lt;sup>4</sup> http://www.epa.gov/cleanenergy/documents/egridzips/eGRID\_9th\_edition\_V1-vear\_2010\_Summary\_Tables.pdf.

year\_2010\_Summary\_Tables.pdf.

http://www.epa.gov/cleanenergy/documents/egridzips/eGRID\_9th\_edition\_V1-year\_2010\_Summary\_Tables.pdf.

<sup>6</sup> http://pubs.usgs.gov/circ/1344/pdf/c1344.pdf.

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- <u>Unobtrusive Installation</u>: The installation of a Bloom Energy Server involves only the construction of a concrete pad and interconnects to the electric grid, gas supply, and the internet. As a result, siting impacts are minimal, without disruption of wetlands, streams, forests or aesthetics.
- Replaces Diesel-Powered Generators: The Servers are increasingly relied on to
  provide reliable power to schools, hospitals, public safety facilities and other users
  who cannot afford to lose power. Using these Servers eliminates the need for dieselpowered generators and the associated exposures to harmful diesel exhaust, thus
  providing a significant public health benefit, which is especially important for the
  sensitive populations (children, the elderly and the sick) most affected by diesel
  exhaust emissions.

The Bloom Energy system's environmental benefits have been recognized by numerous organizations and individuals committed to protection of the environment. Among others, the Environmental Defense Fund has highlighted the role Bloom will play in the drive towards a sustainable future: "This kind of technology is a win-win economically and environmentally, one from which all sectors stand to benefit" (Jim Marston, EDF vice president for energy programs). Carl Pope, former chairman and executive director of the Sierra Club, praised Bloom stating: "This fuel-cell technology could make obsolete the need to back up grid power with batteries or generators—a requirement for hospitals, data centers, public-safety facilities, and other facilities that can't afford a power outage." And Thomas Friedman wrote about Bloom's founder, Dr. K.R. Sridhar, "A more gentle and thoughtful soul on the issues of energy and environment does not exist."

Bloom Energy is grateful for the recognition it receives from these and other environmental leaders. At Bloom, protecting and improving the environment, and compliance with environmental laws, are core principles of our business.

# II. Bloom Energy's Desulf Units.

# A. The Function of Desulf Units.

Bloom Energy produces electricity primarily from natural gas. <sup>11</sup> Because natural gas is odorless, virtually all gas suppliers in the United States add sulfur compounds to their natural

<sup>&</sup>lt;sup>7</sup> The Servers' power density is greater than 1kW/ft<sup>2</sup> and can fit within a few parking spaces; the Servers produce less than 70 decibels of noise at six feet.

<sup>8</sup> www.edf.org/energy/innovation/fuel-cell-technology.

<sup>&</sup>lt;sup>9</sup> www.huffingtonpost.com/carl-pope/tis-the-gift-to-be-simple b 628219.html.

<sup>&</sup>lt;sup>10</sup> Friedman, Thomas, Hot, Flat and Crowded: Why We Need a Green Revolution, page 419.

<sup>&</sup>lt;sup>11</sup> Bloom Energy also uses renewable biogas in some Servers, and these Servers also use the Desulf Units to prevent any sulfur from reaching the fuel cell.

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gas as a safety precaution, allowing those in the vicinity to smell the gas in the event there is a pipeline leak. The sulfur compounds, however, impede the function of the fuel cell. Accordingly, once the natural gas enters the Server, desulfurization is one of the first steps in Bloom's process of producing electricity. This step occurs in Desulf Units—typically three identical units—through which the natural gas passes. The Desulf Units are filled with adsorbent materials ("filters") to remove sulfur compounds from the natural gas. Without these Desulf Units, Bloom could not manufacture electricity. If the sulfur is not filtered out appropriately, and passes into the fuel cell component of the Server, the fuel cell system experiences a decline in efficiency and ultimately, the fuel cells themselves will become permanently damaged, and electricity generation will cease.

# B. <u>Bloom Energy's Desulf Units Have Structural Integrity and Are Engineered</u> Such That There Can Be No Releases Before They Are Intentionally Opened.

Bloom Energy engineers and builds its Desulf Units to meet exacting specifications to assure that they have structural integrity during operation, while they are out of service for cleaning and maintenance, and for many years of continued operation when returned to service. Because of the potential dangers from natural gas releases, the integrity of the Desulf Units is critical to assuring there will be no releases of natural gas. In fact, the exacting design specifications for the Desulf Units have proved effective. As explained in more detail below, Bloom has an extensive system for detecting any leaks in the Units. In the seven years that the Desulf Units have been in operation, and have been returned to operation after removal of the filters, there has never been a release or leak of natural gas detected from any Unit—whether in operation or out of operation—in Delaware or anywhere else.

The Server is constructed so that if there were a leak from the Desulf Unit or anywhere else in the Server, the system would immediately shut down—no natural gas would flow into or through the Server. Thus, the structural integrity of the Desulf Unit is essential to prevent any releases of gases to the atmosphere, to ensure the safety of customers and their neighbors, and to Bloom Energy's business operation—its ability to produce electricity.

The Desulf Units are built to last for the life of the Server (15+ years) and beyond. The Desulf Units themselves are made of extruded aluminum or zinc-plated steel, with a wall thickness of approximately 5 millimeters. This is more than 5 times the thickness of the steel used in DOT drums certified for shipping hazardous materials.

One fact of particular importance to the issues at hand is that the Desulf Units cannot be opened without special equipment and instructions. The bolts on the top of the Desulf Units

<sup>&</sup>lt;sup>12</sup> Each server typically contains a fourth back-up Unit which is available, but not operational, except (1) in the event of a malfunction in one of the three operational Desulf Units, or (2) to transition during the process of replacing the three operational Desulf Units being removed for maintenance.

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are torqued to 24 foot pounds, and the bottom bolts are torqued to 15 foot pounds to ensure tightness and prevent releases. The 8 bolts (+1 eye bolt) on the top and the 9 bolts on the bottom are closed using a precise (and not discernible) torque sequence, as illustrated in the enclosed page of instructions. See Enclosure 2. This unique closure sequence distributes the loading evenly across the surface as individual screws are tightened to the specific torque, similar to a lug nut tightening pattern used for car wheels. As a result, the Desulf Units are sealed, until purposely opened, in a secure manner. After closure, the Unit gaskets are subjected to multiple pressure tests, further ensuring that no accidental opening or release can occur. These tests include: a bottom gasket pressure test (23-35 pounds per square inch (psi)); a whole Unit 60 minute soak test (24 psi, to validate that there are no leaks found after 60 minutes); and immediately following the 60 minute soak test, a 20 minute decay test (22.5 psi, to validate no pressure loss over the 20 minute period).

# C. Removal and Management of the Desulf Units for Cleaning and Maintenance.

Approximately every six to twelve months, Bloom Energy removes the Desulf Units from service in order to remove the filters, replace them with fresh filters, and return the Units to service. Before they are removed from service, the Desulf Units are purged of natural gas, with the gas being sent on through the remaining components of the server to generate electricity. Because the Units are removed from service while the filters are still able to function to remove sulfur, there is flexibility in the exact timing of removal. Typically, Bloom will remove the Desulf Units from service to coincide with scheduled pick up for transportation to the facilities in Texas at which they are opened and the contents removed.

When a Desulf Unit is removed from service, a self-sealing mechanism automatically seals shut the piping manifolds through which natural gas passes through the unit. This automatic valve closure feature ensures that (1) contents cannot leak or escape until the unit is opened to remove the contents, and (2) human error in execution cannot lead to gas release. The Desulf Units are removed from service long before the filters are spent, but after they have begun to experience—or are expected to experience—a gradual decline that would, if it continued over several months, threaten the performance of the Server's fuel cells.

Once removed from service, the Desulf Units are promptly sent to a licensed transfer facility in Texas that: (1) opens the unit and removes the filter, with removal performed by technicians who have received training from Bloom; (2) reclaims or arranges for reclamation of copper from the filters; and (3) collects the post-reclamation filter residue and ships it to a licensed Treatment, Storage and Disposal Facility (TSDF). There is no other material in the filter, or left as residue inside the units, that raises any RCRA or other waste concerns.

<sup>&</sup>lt;sup>13</sup> In December of 2014, DNREC staff wrote to Bloom Energy questioning the application of the MPU exemption to the Desulf Units. In response, Bloom Energy has managed the Desulf Units in Delaware as

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Once the filter is removed from the Desulf Units, the Units are cleaned and returned to Bloom Energy to be refilled and reused.<sup>14</sup> It is an economic necessity for Bloom that the Desulf Units be properly managed such that they are out of service for the shortest possible period and can be promptly returned to service in another Server.

The Desulf Units themselves are valuable in several respects which require that Bloom account for them and assure that none "go missing." They are expensive to manufacture—the materials alone cost several thousand dollars, even without taking the additional shipping and labor costs into account. They represent a reusable technology that is integral to the Bloom Energy business operation which requires a seamless supply chain of Desulf Units to support continuous operation of its Servers at client sites. And, finally, the filters themselves contain copper—up to 30% of one of the filter materials—which is generally reclaimed and has value. The reuse of Desulf Unit materials, as well as the canisters themselves, is in keeping with the Bloom "cradle-to-cradle" culture, where we have a zero-waste objective, and do not discard anything we can reuse.

# D. Only a Small Proportion of the Desulf Units Test RCRA Hazardous.

As is apparent from the fact that filters are shipped from the transfer facility to a licensed TSDF, Bloom has managed the filters as hazardous wastes once the Desulf Units are opened and emptied and/or reclaimed. That is because, although the filters' sole purpose is to adsorb non-RCRA hazardous sulfur from the natural gas, the filter may also adsorb a small amount of the benzene that is typically present in natural gas.

Bloom Energy tested Desulf Unit filters from each of the four Delaware sites. The results at all four sites are non-hazardous for RCRA metals and at three of the four sites the filters were below the RCRA toxicity characteristic for benzene. Only at one of the four sites in Delaware did the Desulf Units test above the RCRA benzene limit. (Given the high proportion of filters that are not RCRA hazardous, the Company is developing a plan for testing the material, once it is removed from the Desulf Units, so that materials that are non-hazardous could be managed accordingly, if necessary.)

hazardous waste from the time they are removed from service, pending resolution of the issues addressed in this letter. This letter describes the process that was used before December 9, 2014 in Delaware and continues to be followed in the other states in which Bloom Energy does business.

<sup>&</sup>lt;sup>15</sup> Enclosure 3 is the report on the January 21, 2015 test results. Please see pages 7-10 for the metals and volatile organic compounds (VOCs) results from the four Delaware sites.

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# III. Applicability of Hazardous Waste Laws and Regulations

As described above, in a few instances the filters in the Desulf Units adsorb a sufficient amount of benzene to exceed the RCRA benzene limit. However, for RCRA's hazardous waste regulations to apply to the filters, they must be both (1) hazardous and (2) a solid waste. Bloom believes that the filters are not subject to hazardous waste regulations at any point before the Desulf Units are opened for the purpose of removing the filters.<sup>16</sup>

A. The Desulf Units Fall Squarely Within the Plain Language of the MPU Exemption.

From the outset of Bloom's commercial operations, it has understood its Desulf Units to be MPUs, which are exempt from regulation as hazardous waste until they are opened and the contents removed.

This exemption was first adopted by EPA and subsequently adopted by Delaware. Both Delaware law and the RCRA regulations provide, in identical language:

Hazardous wastes which are exempted from certain regulations. A hazardous waste which is generated in a product or raw material storage tank, a product or raw material transport vehicle or vessel, a product or raw material pipeline, or in a manufacturing process unit ..., is not subject to regulation [as a hazardous waste] until it exits the unit in which it was generated....unless the hazardous waste remains in the unit more than 90 days after the unit ceases to be operated for manufacturing. . . .

40 CFR 261.4(c) (emphasis added); Adopted verbatim at Delaware Hazardous Waste Regulations (Delaware Regulations) Section 261.4(c).

B. The Desulf Units Fit the Explanation and Description of MPUs in the Preamble Accompanying Adoption of the MPU Exemption by EPA.

The MPU exemption contains a clear statement of the rationale for the exemption:

[T]he rationale for exempting hazardous waste from regulation while it remains in the unit within which it was generated is

<sup>&</sup>lt;sup>16</sup> Even at that point, the copper in the filters is often reclaimed, such that waste is not generated until the reclamation process is complete. 40 CFR 261.1(c) (3) and (4); Delaware Regulations Section 261.1(c) (3) and (4).

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> that the unit will have structural integrity against releases and will be operated to prevent such releases.

45 Fed. Reg. 72025 (emphasis added).

Structural Integrity. As explained in further detail above, the Desulf Units have exceptional structural integrity. They are made from extruded aluminum or zinc-plated steel with a wall thickness that is 5 times greater than what is required by DOT for containers shipping hazardous materials and wastes. Their structure and their engineering (including self-closure mechanisms and barriers to unauthorized opening) guard against any potential accidental releases prior to intentional, authorized opening of the Desulf Units. These units must be extremely durable and secure because they are designed to contain natural gas under pressure, and to be used and reused for that purpose many times over. Indeed, as discussed above, Bloom subjects each Desulf Unit upon closure to three separate pressure tests to confirm that the Units are tightly sealed. Moreover, as further confirmation of the structural integrity of the Desulf Units, Bloom had the Units tested by a DOT certified testing agency. The Bloom Unit passed all DOT testing requirements – drop test, stacking test and vibration test – for steel, aluminum or other metal containers used to ship hazardous materials. <sup>17</sup> In sum, these Units clearly "have structural integrity against releases" and are "operated to prevent such releases"—the characteristics which EPA concluded made it appropriate to remove containers from regulation as solid wastes.

EPA further states that most MPUs are units that:

are designed and operated to hold valuable products or raw materials in storage or transportation or during manufacturing. Because of their design and operation, these units are capable of holding... the hazardous wastes which are generated within them, until the wastes are purposefully removed. Thus, these hazardous wastes are contained against release into the environment... and the risks they pose to human health or the environment are very low and are only incidental to the risks posed by the valuable product or raw material with which they are associated....

Except where the unit...is not operating, as discussed below, the Agency believes that the hazardous waste generated in such a unit should only be subject to regulation when it is

<sup>&</sup>lt;sup>17</sup> This testing was prompted in part by questions posed by DNREC, during our meeting, regarding whether transportation would affect the integrity of the Units. We believe that these results should resolve any remaining concerns in that regard.

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removed from the unit. In most cases, it is only after the removal of hazardous wastes from these units that the wastes have the potential for releasing hazardous constituents into the environment and posing a substantial hazard to human health or the environment....

45 Fed. Reg. 72025 (emphasis added).

This rationale applies fully to Bloom's Desulf Units, which are specifically designed and operated to be capable of holding the valuable raw material—natural gas—that passes through them, as well as the copper-rich filter media through which the gas passes. They have strong structural integrity. If the Desulf Units were to leak, the system would shut down, and the Server would fail to produce electricity. Detectors within the Server are in place to detect *any* gas leaks; under that scenario, these would shut down the manufacturing process and prevent negative impact.

This exceptional leak detection system makes it unnecessary to speculate about the integrity of the Desulf Units. The fact is that in the seven years that Bloom has operated its Servers, there has not been a single release of natural gas detected from the Desulf Units. Bloom's Desulf Units are made to last, and are built to be used and reused for many years without leaks or releases.

**90-Day Limitation.** RCRA regulations contemplate that the rationale behind the MPU exemption does not apply indefinitely. Given the prerequisite that these units have structural integrity in operation, EPA concluded that one could reasonably assume such integrity would remain intact for 90 days after the exempted units were removed from service.

EPA recognizes that manufacturing units ... are occasionally taken out of operation for temporary periods ... [for] business reasons [or] for maintenance or repair.... For both temporary and permanent shutdowns, the Agency will allow a reasonable time to remove any hazardous wastes that remain in the unit after operation ceases. Given the presumption that the unit has integrity before cessation of operation, the Agency believes that a reasonable time is 90 days.... If hazardous wastes remain in these units more than 90 days after cessation of operation, EPA believes that these wastes should be fully regulated....

45 Fed. Reg. 72025 (emphasis added).

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Accordingly, only two events after removal of an MPU from service can trigger a requirement to manage hazardous wastes according to RCRA requirements:

- (1) removal of the waste from the MPU; or
- (2) passage of 90 days after removal from service.

While the Preamble contemplates taking MPUs out of service for maintenance purposes, it does not specify that this maintenance must take place on site. Bloom Energy removes the Desulf Units for maintenance purposes and sends them off-site for opening, removal of used filters, and refilling with new filters. The Units are removed from various Servers in geographic proximity to each other at approximately the same time, so that Units to be replaced can be removed for maintenance in a single shipment and the replacement Desulf Units can be delivered in a single shipment. This is a process that takes days, not months, because of the need to rotate the units back into operation. <sup>18</sup>

C. <u>The Desulf Units Are Analogous to the Tanks Referenced in the Federal</u> Register Preamble.

The MPU exemption is contained within a broader regulation that also exempts hazardous wastes generated within storage tanks and transport vehicles and vessels. EPA's Preamble cites to sludges and residues produced in tank trucks, rail tank cars, and tanks or holds of ships, which must periodically be removed through washing. 42 Fed. Reg. 72025. It also cites to sludges and sediments that are produced in tanks that store crude oil and refined petroleum products such as gasoline, which must also be removed periodically.

In the respects relevant here, Desulf Units, EPA's rationale for exempting hazardous waste sludges in rail tank cars until those cars are opened applies equally to the desulfurization filters before the Desulf Units are opened. Although both tank cars and Desulf Units can be and are moved, the hazardous wastes within both are contained in a sealed environment, posing minimal risk of accidental release. The moment that sludge in a tank car is removed, or the filter is taken from a Desulf Unit, is the moment when the potential for release comes into being and, hence, the moment when they become regulated as wastes under RCRA.

D. The Desulf Units Are Analogous to the Non-Exhaustive List of MPUs
Referenced in the Federal Register Preamble, and Are Distinguishable From
Disassembled Heat Exchangers.

Although the regulation itself does not further define an MPU, the Federal Register Preamble contains a non-exhaustive set of examples of MPUs. Most of these examples are associated

<sup>&</sup>lt;sup>18</sup> Bloom Energy does not manufacture replacement Desulf Units—only Desulf Units needed for additional Energy Servers—and Bloom Energy does not maintain a large pool of spare Desulf Units.

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with refineries and similar large-scale industrial operations that filed comments on the RCRA regulations when they were originally proposed. In addition to tanks storing material such as petroleum, the Preamble cites to

[o]ther examples occur[ing] in a great many manufacturing processes, where hazardous wastes are generated in process units, such as distillation columns, flotation units, and discharge trays of screens and in associated non-waste-treatment process units such as cooling towers.

45 Fed. Reg. 72025.

**Examples.** The "other examples" provided by EPA are of equipment in which hazardous wastes reside for some period of time prior to removal of the hazardous waste. They reflect EPA's recognition that many manufacturing processes (such as flotation units and distillation columns—just like Desulf Units) include a step where needed materials are separated from unneeded or unwanted materials. EPA further recognizes that the hazardous materials created in the process, or through otherwise processing raw material, should not be regulated as hazardous wastes until the units are opened and their contents removed.

That Desulf Units used in fuel cells are not included among EPA's non-exhaustive examples of MPUs is neither surprising nor significant. EPA's examples derive largely from examples cited in comments it received from oil refiners and other major industry groups seeking to ensure that *their* MPUs would be exempt from regulation under hazardous waste laws. Applied fuel cell technology was generally still in its infancy in the late 70's and early 80's when EPA was writing the RCRA regulations, and the potential for Desulf Units to adsorb benzene from natural gas in connection with a fuel cell generating electricity would not have been on EPA's radar. If it had been, there is no reason to believe Desulf Units associated with fuel cells would not have been included as an example of an exempt MPU. There is no environmental policy rationale for reading EPA's examples as an attempt by EPA to categorize either Desulf Units or every MPU moved off site for cleaning as ineligible for the exemption.

**Heat Exchangers.** The DNREC staff has cited an EPA guidance document prepared in response to a question posed by phone to the RCRA hotline in 1990, which states that the MPU exemption does not apply to a heat exchanger disassembled for cleaning off site. RCRA Online #13374, May 1990, Enclosure 4. This document neither compels nor supports the proposition that an MPU must be stationary to qualify for the MPU exemption. Rather the document is fully consistent with EPA's view that *structural integrity* (not location) is the critical issue. For the reasons described above, the structural integrity of these Desulf Units exceeds that of most of the examples of MPUs provided by EPA, and bears no relation to heat exchangers.

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In the 1990 guidance document, EPA analyzed whether the exemption applies when a refinery "disassembles" a heat exchanger within which sludge forms during the heat exchange process. EPA states that the exemption does not apply to an MPU *if the unit is disassembled for cleaning off-site*, for two reasons: (1) "the incentive to maintain the unit's integrity to prevent leaks or unintended releases is substantially reduced when the unit is taken out of operation;" and (2) "there would be a loss of the unit's structural integrity if it were to be disassembled for off-site shipment, with a potential for hazardous waste releases."

Bloom Energy is highly incentivized to maintain the Desulf Units' integrity. As explained above, Bloom has both compelling business and safety "incentive[s] to maintain the unit's integrity to prevent leaks or unintended releases" even after it is taken out of operation. Unlike a heat exchanger, which contains no valuable commodity either in-service or out of service, Bloom's Desulf Units contain the natural gas essential to their operation and must do so with no possibility of release. The Desulf Units contain valuable copper, which is generally reclaimed. And the Desulf Units are themselves valuable equipment—a value which would be largely nullified if the equipment's structural integrity were compromised, thereby making them unfit for reuse processing pressurized natural gas.

A heat exchanger is not a storage device that can safely contain materials when it is removed from the system shell, thereby posing the risk of dispersement of toxic substances during transportation. That is not at all the case for the Bloom Desulf Unit, as explained above.

The loss of the heat exchanger's structural integrity, upon disassembly, is irrelevant to Desulf Units. EPA's second stated reason for not applying the MPU exception to the heat exchanger described in its document—the loss of structural integrity if the heat exchanger is disassembled—is specific to heat exchangers. Bloom Energy does not disassemble Desulf Units. Rather, Bloom removes sealed Desulf Units and sends the Desulf Units intact to a transfer facility in Texas for removal of the filters and recovery of the copper. It is only when the Desulf Units are received at the transfer facility that they are opened, cleaned, and disassembled.

As can be seen in the images in Enclosure 5, Desulf Units and heat exchangers have very little in common.<sup>19</sup> Heat exchangers are sometimes cleaned on-site, and sometimes sent offsite for servicing. In the latter event, the heat exchangers are drained of most of their product contents and then left unsealed for shipment, allowing for leaks and releases. Heat exchangers are characterized by numerous openings in which pipes are inserted while they are in operation. When the heat exchangers are removed from operation, these pipes are

<sup>&</sup>lt;sup>19</sup> Because EPA's files contained no information regarding the facts on heat exchangers considered by EPA when it issued the 1990 guidance document, Bloom Energy's counsel has engaged in detailed discussions with a company which has, for many years, been a leading provider of off-site servicing of heat exchangers, as well as with some of its clients.

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removed, but the openings for the pipes remain open. Thus, simply removing a heat exchanger from service—regardless of whether it is further disassembled thereafter for off-site cleaning—creates the potential for leaks and releases. This is a critical risk point distinguishing Desulf Units from heat exchangers structurally. The Desulf Units have only three openings for the coupling hoses and these are automatically sealed shut when the gas lines are removed, and they remain sealed until the Units are opened for cleaning at an appropriate off-site facility.

E. Quite Apart From the MPU Exemption, EPA Has Since 1982 Viewed
Residues Remaining in Gas Units When Returned by Customers as Being
Excluded From the Definition of Solid Waste.

EPA itself has long considered residual gas in compressed gas containers not to be a waste. See 47 Fed. Reg. 36094 (August 18, 1982). The issue arose shortly after the final RCRA regulations were adopted in the context of questions about whether gas units (e.g., propane, oxygen, etc.) could be considered "empty" when shipped for refilling after customer use. EPA stated that the question was not whether the unit was empty, but rather whether the contents were a "waste:" "[T]he customer is not generating a waste by merely returning the cylinder and neither the returned container nor the contained residue is a 'solid waste' as that term is defined in [RCRA] and 40 CFR Part 261." EPA advised that the "return of the supplier's cylinder that may hold some residue does not constitute the shipment of a solid (or hazardous) waste." This fact scenario presents essentially the same issues as the management of Desulf Units, which contain a residue but are returned for refilling.

IV. Application of the MPU Exemption to the Desulf Units Produces Better Results for the Environment than Regulating Them as Hazardous Waste Upon Being Removed From Service.

Section I of this letter describes the environmental benefits of Bloom's technology. We do not repeat them here. However, it should be recognized that requiring the Desulf Units to be considered waste subject to RCRA simply because they have been removed from service may both create environmental/health risks which would otherwise be virtually non-existent, and limit the use of—and therefore the environmental benefits to be derived from—this technology.

A. <u>Denying Application of the MPU Exemption to Desulf Units Taken out of Service Increases Risks.</u>

As discussed above, Bloom Energy's analysis of Desulf Units at its four Delaware locations found that only one in four exceeded the RCRA limit for benzene. Given the small proportion of Units that exceed this limit, it would not be economically rational for Bloom to continue managing all of its Desulf Units in Delaware as hazardous waste from the moment

# MORRISON FOERSTER

The Honorable David Small March 12, 2015 Page Fifteen

they are taken out of operation. This would effectively encourage Bloom to open every Unit at customer sites in order to perform a waste characterization. While it makes financial sense to do so, it does not make sense from an environmental point of view.

First, opening individual Units for characterization at each customer site would increase the number of people required to handle the contents of the Units. Not only is each of these individuals potentially exposed to the material, they also need to reach the site, increasing traffic and other associated inconveniences of having third-party workers at the sites.

Second, opening the Units for testing on-site increases the number of occasions those contents are handled and, therefore, the potential for emissions (even if these are below regulatory limits).

B. <u>Denying the MPU Exemption Will Have Adverse Consequences for Delaware</u> Businesses and for the Environment.

The alternative to opening the Desulf Units on-site is to manage all of the Desulf Units as hazardous wastes the moment they are removed from service. This would guarantee that a large proportion of *non-hazardous* waste would be managed as hazardous—a result directly contrary to EPA's waste minimization efforts.

Even more troubling is the impact on Bloom Energy's present and future customers. Every site at which a customer installs a Bloom Energy Server in support of its sustainability objectives would suddenly be transformed into a hazardous waste generation site the moment the Units are removed from service. An EPA Generator Identification Number would have to be issued for every school, government building, hospital, public library or other facility using Bloom Servers—whether for backup power or to meet their full energy demands triggering potential requirements for permits, facility self-inspections, recordkeeping and reporting, contingency planning and the like. Even where the cost or obligation to implement these requirements can be assumed by Bloom, the designation as a hazardous waste generation site is tied very directly and explicitly to the customer. For energy users like schools, public buildings, or clean businesses that may generate no other hazardous waste, often as a result of programs they put in place to achieve that very goal, such a designation has a host of negative implications which are likely to result in a significant disincentive to their adoption of this clean technology. The unintended consequence, clearly, will be to slow down the rate of CO<sub>2</sub> reduction attributed to power generation—plainly a result neither Delaware nor EPA wants.

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C. <u>There Are No Offsetting Environmental Benefits to Requiring that Desulf Units Be Managed as RCRA Wastes Before They Are Opened.</u>

One of the primary issues raised by DNREC staff at the January meeting was whether, without a requirement to manage the Desulf Units' contents as hazardous from the moment of removal from service, there would be increased risks in transit. As demonstrated above, there are no such real risks. The only appreciable difference in the transportation of Units if the MPU exemption does not apply, is that the Units' contents will be accompanied by one form of paper—a manifest—from the time the Units are removed from service. Under the MPU exemption, the Units' contents would travel under a different form of shipping paper prior to the point of waste generation at the facility that opens the Units, at which point the contents would be manifested. It is difficult to see the benefit achieved by imposing a manifest requirement at an earlier stage, given that Bloom's management and handling of the Units would be virtually identical. Either way, no Desulf Units will go missing.

Nor is there any difference in the risks posed in transit. As explained in detail elsewhere in this letter, the Desulf Units themselves are every bit as secure—likely more so—than containers used by hazardous waste transporters. Finally, the reality is that the Units' contents pose very low risks, if any, to the environment, whether in a sealed or opened container. The benzene which brings them within the definition of "hazardous" is present solely because it is adsorbed onto the Units' filters. This adsorbed benzene can only be released (such that it could pose a potential risk of actual harm) if the filters are heated to temperatures exceeding 180 degrees Celsius (356° F). So, no environmental risks can occur unless the Unit—which is carefully sealed and subjected to multiple pressure tests upon closure, requires training and specialized equipment to open, and has structural integrity equivalent to hazardous waste transportation packaging—is first opened and then heated to an extremely high temperature. Such an improbable scenario is far less likely than human or environmental contact with a rail car left unattended on a siding, or a product tank removed from service.

## V. Conclusion

Bloom Energy provides electric power with a dramatically reduced environmental footprint as compared to traditional energy sources. In doing so it has made every effort to comply rigorously with all environmental requirements. This is true, as well, of its management of the Desulf Units which are an integral part of its energy production process.<sup>20</sup>

<sup>&</sup>lt;sup>20</sup> Bloom Energy takes pride that, in its seven years in operation, it has never received a notice of violation from any environmental agency or prosecutor, whether in Delaware or elsewhere.

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Bloom's Desulf Units fit squarely within the MPU exemption in both RCRA and Delaware law:<sup>21</sup> the Units satisfy the literal regulatory language of the exemption; they are analogous to examples of MPUs provided by EPA; and application of the MPU exemption to the Desulf Units is entirely in keeping with the intent and the rationale for the exemption. As such, the Desulf Units are exempt from regulation until no sooner than the time they are opened for cleaning.

Neither EPA nor any State has ever concluded that Desulf Units must be managed as hazardous wastes before they are opened. Nor would there be any environmental benefit to doing so. There is no realistic prospect that the benzene in the small proportion of Desulf Units that test RCRA hazardous will be released before the Units are intentionally opened by authorized personnel. As evidenced by, among other things, the fact that these Units pass DOT testing requirements for metal containers used to ship hazardous materials, they have structural integrity equivalent to containers that would be used if they were shipped under a manifest. Moreover, the benzene inside the Units is adsorbed onto filter material and could not pose a risk without being heated to high temperatures.

The reality is that insisting that these Desulf Units be regulated simply because they are taken out of service will have an adverse impact on the environment. It would force Bloom to have the Desulf Units opened on site to determine whether or not the contents exceed RCRA limits, thereby increasing the potential for exposure to people within the State of Delaware, a population that would otherwise never be exposed to benzene in the Units. It would also require a RCRA Identification number for every site in Delaware at which there are Bloom Servers. The net effect would be to brand Delaware companies which have improved the environment by using this alternate technology, as sites of hazardous waste generation. This does not serve the purposes of RCRA, or Delaware law, or the environment. Denying application of the exemption could disadvantage Delaware

As a separate matter, Bloom Energy believes that reclamation of copper from the filters exempts the filters from the requirement to manage them as hazardous wastes under 40 CFR 261.1(a) and Delaware Hazardous Waste Regulations Section 261.1(a). Reclamation removes certain materials from the definition of solid waste. 40 CFR 261.2(c) (3); Delaware Regulations Section 261.2(c) (3).

A material is "reclaimed" if it is processed to recover a usable product, or if it is regenerated. Examples are recovery of lead values from spent batteries....

<sup>40</sup> CFR 261.1(c) (4); Delaware Regulations Section 261.1(c) (4). Bloom Energy's reclamation of copper from the filters is similar to the reclamation of lead from batteries.

We have not provided a detailed analysis of this further exemption inasmuch as this letter is addressed to the application of the MPU exemption, which we believe is fully justified on the facts presented. But we would be pleased to provide further details on this reclamation exception should DNREC wish to receive them.

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companies that use Bloom's clean technology as compared to their counterparts in states which do not interpret the law the same way; it would also disadvantage those Delaware companies that get their electricity from Bloom's clean technology, as compared to those whose energy sources pollute the planet. We are confident that this is not the result DNREC desires, nor is it a result compelled by law.

Thank you for permitting us the opportunity to present Bloom Energy's position in writing. Bloom looks forward to continuing its strong working relationship with DNREC and its staff and is available to discuss the contents of this letter with you if that would be of assistance.

Very truly yours,

Michèle B. Corash

Counsel to Bloom Energy

## Enclosures

cc:

Kara Coats (Via Fed Ex)

Michele B Coroxa

Deputy Secretary

DNREC

Marjorie Crofts (Via Fed Ex)

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Karen G. J'Anthony (Via Fed Ex) Environmental Program Manager I DNREC The Honorable David Small March 12, 2015 Page Nineteen

> Melissa Ferree (Via Fed Ex) Engineer III DNREC

David L. Ormond, Jr. (Via Fed Ex) Deputy Attorney General Delaware Department of Justice

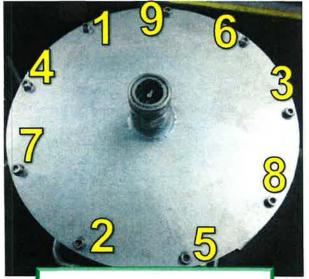
# FRU TUCSON DESULFURIZER CANISTER FILL Step 20 Install Top Lid

a. Torque the lid bolts to 25 Nm using a star pattern as in picture "A"; using the 25 Nm torque wrench with a 6MM hex bit and counter-torqueing using ½" wrench

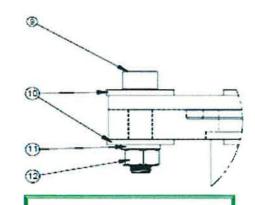
All bolts are torqued to 25 Nm

b. Using a 25 Nm torque wrench, torque again all screws following sequence on picture "B" using the same 25Nm torque.

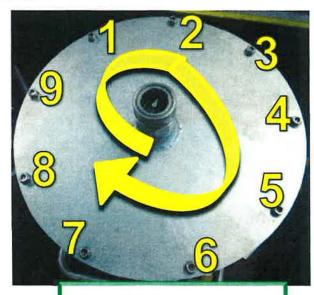
Screws torqued to 25 Nm



Picture "A" Torque sequence

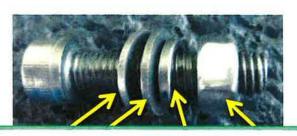


9. M8 Bolt 10. M8 Flat washer 11. M8 Spring Lock Washer 12. M8 Nut



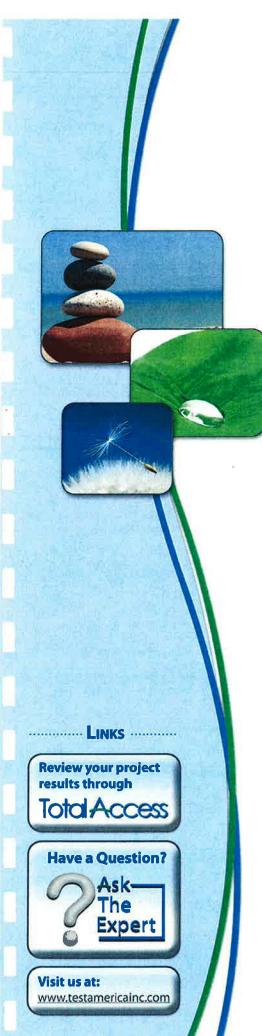
Picture "B" Torque sequence





(2) M8 Flat washer, M8 Spring Lock Washer, M8 Nut





# <u>TestAmerica</u>

THE LEADER IN ENVIRONMENTAL TESTING

# ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Houston 6310 Rothway Street Houston, TX 77040 Tel: (713)690-4444

TestAmerica Job ID: 600-105226-1

Client Project/Site: Bloom Energy Scrubber Media Sampling

#### For

VLS Recovery Services 17020 Premium Drive Hockley, Texas 77447

Attn: Quinten Cazares

Hais a daze

Authorized for release by: 1/21/2015 6:27:19 PM
Gail Lage, Senior Project Manager (615)301-5741
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Designee for

Kristy Ricke, Project Manager I (713)690-4444 kristy.ricke@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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TestAmerica Job ID: 600-105226-1

Client: VLS Recovery Services

Project/Site: Bloom Energy Scrubber Media Sampling

Job ID: 600-105226-1

Laboratory: TestAmerica Houston

Narrative

Job Narrative 600-105226-1

#### Receipt

The samples were received on 1/16/2015 3:51 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 23.1° C.

#### Except:

The following sample(s) was received at the laboratory outside the required temperature criteria: Bloom Composite Media - Brookside Location (600-105226-2), Bloom Composite Media - J.P. Morgan Location (600-105226-4), Bloom Composite Media - Plant 6 Location (600-105226-3), Bloom Composite Media - Red Lion Location (600-105226-1). The sample(s) is considered acceptable since it was collected and submitted to the laboratory on the same day and there is evidence that the chilling process has begun.

No ice was in cooler

#### GC/MS VOC

Method(s) 8260B: Surrogate (BFB) recovery for the following sample(s) was outside control limits: (600-105226-2), Bloom Composite Media - Brookside Location (600-105226-2). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed. Sample will be rerun with medium level.

Method(s) 8260B: Internal standard responses were outside of acceptance limits for the following sample(s): (600-105226-1), (600-105226-4), Bloom Composite Media - J.P. Morgan Location (600-105226-4), Bloom Composite Media - Red Lion Location (600-105226-1). The sample(s) shows evidence of matrix interference. Sample is carbon powder and will be rerun with medium level.

Method(s) 8260B: The following sample(s) was diluted due to the nature of the sample matrix: (600-105226-1), (600-105226-2), (600-105226-4), Bloom Composite Media - Brookside Location (600-105226-2), Bloom Composite Media - J.P. Morgan Location (600-105226-4), Bloom Composite Media - Red Lion Location (600-105226-1). Elevated reporting limits (RLs) are provided. Sample is carbon powder

Method(s) 8260B: The following sample(s) was diluted due to the nature of the sample matrix: (600-105226-3), Bloom Composite Media - Plant 6 Location (600-105226-3). Elevated reporting limits (RLs) are provided.

Method(s) 8260B: Internal standard (ISTD) response for the following sample(s) was outside control limits: (600-105226-3), Bloom Composite Media - Plant 6 Location (600-105226-3). The sample(s) was re-extracted and/or re-analyzed with concurring results, and the original set of data has been reported.

Method(s) 8260B: Surrogate recovery for the following sample(s) was outside control limits: (600-105226-3), Bloom Composite Media - Plant 6 Location (600-105226-3). Re-extraction and/or re-analysis was performed with concurring results. The original analysis has been reported.

Method(s) 8260B: Surrogate recovery for the following sample(s) was outside control limits: (600-105226-1), (600-105226-2), (600-105226-4), Bloom Composite Media - Brookside Location (600-105226-2), Bloom Composite Media - J.P. Morgan Location (600-105226-4), Bloom Composite Media - Red Lion Location (600-105226-1). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed. Samples are catalyst.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### Metals

Method(s) 6010B: The leachate blank for batch 154045 contained Barium above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed.

Method(s) 6010B: The following sample(s) was diluted due to the abundance of non-target analytes: (600-105226-1), (600-105226-1 DU), (600-105226-1 MS), (600-105226-2), (600-105226-3), Bloom Composite Media - Brookside Location (600-105226-2), Bloom Composite Media - Plant 6 Location (600-105226-3), Bloom Composite Media - Red Lion Location (600-105226-1). Elevated reporting

# **Case Narrative**

Client: VLS Recovery Services

Project/Site: Bloom Energy Scrubber Media Sampling

TestAmerica Job ID: 600-105226-1

Job ID: 600-105226-1 (Continued)

Laboratory: TestAmerica Houston (Continued)

Ilmits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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# **Definitions/Glossary**

Client: VLS Recovery Services

Project/Site: Bloom Energy Scrubber Media Sampling

TestAmerica Job ID: 600-105226-1

# Qualifiers

G	C	MS	VO	Δ
U	V		A C	~

Qualiner	Qualifier Description
*	ISTD response or retention time outside acceptable limits
X	Surrogate is outside control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

### Metals

Qualifier Description
Indicates the analyte was analyzed for but not detected.
Compound was found in the blank and sample.
Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

# Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
п	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# **Sample Summary**

Client: VLS Recovery Services

Project/Site: Bloom Energy Scrubber Media Sampling

TestAmerica Job ID: 600-105226-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
600-105226-1	Bloom Composite Media - Red Lion Location	Solid	01/16/15 13:35	01/16/15 15:51
600-105226-2	Bloom Composite Media - Brookside Location	Solid	01/16/15 13:41	01/16/15 15:51
600-105226-3	Bloom Composite Media - Plant 6 Location	Solid	01/16/15 13:47	01/16/15 15:51
600-105226-4	Bloom Composite Media - J.P. Morgan Location	Solid	01/16/15 13:52	01/16/15 15:51

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Client: VLS Recovery Services

Project/Site: Bloom Energy Scrubber Media Sampling

TestAmerica Job ID: 600-105226-1

### Client Sample ID: Bloom Composite Media - Red Lion

Method: 8260B - Volatile Organic Compounds (GC/MS)

Location

Date Collected: 01/16/15 13:35 Date Received: 01/16/15 15:51 Lab Sample ID: 600-105226-1

Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.428		0.0500	0.00630	mg/Kg			01/17/15 15:30	10
Ethylbenzene	0.0125	J	0.0500	0.0102	mg/Kg			01/17/15 15:30	10
Xylenes, Total	0.0825		0.0500	0.0113	mg/Kg			01/17/15 15:30	10
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	68		61 - 130				01/16/15 16:18	01/19/15 13:22	1
Dibromofluoromethane	62	×	68 - 140				01/16/15 16:18	01/19/15 13:22	1
Toluene-d8 (Surr)	22	X	50 - 130				01/16/15 16:18	01/19/15 13:22	1
4-Bromofluorobenzene	7	X	57 <sub>-</sub> 140				01/16/15 16:18	01/19/15 13:22	1
1,2-Dichloroethane-d4 (Surr)	80		61 - 130					01/17/15 15:30	10
Dibromofluoromethane	92		68 - 140					01/17/15 15:30	10
Toluene-d8 (Surr)	127		50 - 130					01/17/15 15:30	10
4-Bromofluorobenzene	153	X*	57 - 140					01/17/15 15:30	10
Toluene	203		12.5	3,45	mg/Kg	_	01/16/15 16:18	01/19/15 16:16	20
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	75		61 - 130				01/16/15 16:18	01/19/15 16:16	20
Dibromofluoromethane	93		68 - 140				01/16/15 16:18	01/19/15 16:16	20
Toluene-d8 (Surr)	20		50 - 130				01/16/15 16:18	01/19/15 16:16	20
4-Bromofluorobenzene	28	X	57 - 140				01/16/15 16:18	01/19/15 16:16	20
Method: 6010B - Metals (ICP) - To	CLB								
Analyte		Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.350		0,100	0.0328	mg/L		01/20/15 13:48	01/21/15 11:57	1
	0.000								
Barium	0.305	В	0.200	0.0220	mg/L		01/20/15 13:48	01/21/15 11:57	1
<mark>Barium</mark> Cadmium			0,200 0,0500		mg/L mg/L		01/20/15 13:48 01/20/15 13:48	01/21/15 11:57 01/21/15 11:57	
	0.305	U		0.00350					1
Cadmium	<b>0.305</b> 0.00350	υ υ	0.0500	0.00350	mg/L		01/20/15 13:48	01/21/15 11:57	.1

Client Sample ID: Bloom Composite Media - Brookside

Result Qualifier

Result Qualifier

0.145 U

0.0000820 U

ocation.

Analyte

Analyte

Mercury

Lead

Date Collected: 01/16/15 13:41

Method: 6010B - Metals (ICP) - TCLP - DL

Method: 7470A - Mercury (CVAA) - TCLP

Date Received: 01/16/15 15:51

Lab Sample ID: 600-105226-2

01/20/15 13:00 01/20/15 16:52

Analyzed

01/21/15 16:07

Analyzed

**Dil Fac** 

Dil Fac

Matrix: Solid

Prepared

01/20/15 13:48

Prepared

Method: 8260B - Volatile Organic Cor	npounds (	(GC/MS)							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.608		0.0500	0.00630	mg/Kg			01/17/15 15:54	10

RL

RL

0.000200

0.500

MDL Unit

0.145 mg/L

MDL Unit

0.0000820 mg/L

# **Client Sample Results**

Client: VLS Recovery Services

Project/Site: Bloom Energy Scrubber Media Sampling

TestAmerica Job ID: 600-105226-1

Lab Sample ID: 600-105226-2

Client Sample ID: Bloom Composite Media - Brookside

Location

Date Collected: 01/16/15 13:41 Date Received: 01/16/15 15:51

Matrix: Solid

Analyte	Result	Qualifler	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fa
Ethylbenzene	0.0102	Ü	0.0500	0.0102	mg/Kg			01/17/15 15:54	1
Xylenes, Total	0.0887		0.0500	0.0113	mg/Kg			01/17/15 15:54	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fa
1,2-Dichloroethane-d4 (Surr)	81	<del></del>	61 - 130				01/16/15 16:18	01/19/15 13:47	
Dibromofluoromethane	80		68 - 140				01/16/15 16:18	01/19/15 13:47	
Toluene-d8 (Surr)	29	X	50 - 130				01/16/15 16:18	01/19/15 13:47	
4-Bromofluorobenzene	32	X	57 - 140				01/16/15 16:18	01/19/15 13:47	
1,2-Dichloroethane-d4 (Surr)	84		61 - 130					01/17/15 15:54	1
Dibromofluoromethane	94		68 - 140					01/17/15 15:54	1
Toluene-d8 (Surr)	115		50 - 130					01/17/15 15:54	1
4-Bromofluorobenzene	159	X	57 - 140					01/17/15 15:54	1
Method: 8260B - Volatile Organic C	ompounds	(GC/MS) - D	L						
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fa
Toluene	148		6.25	1.73	mg/Kg		01/16/15 16:18	01/19/15 16:40	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fa
1,2-Dichloroethane-d4 (Surr)	88	-	61 - 130				01/16/15 16:18	01/19/15 16:40	1
Dibromofluoromethane	79		68 - 140				01/16/15 16:18	01/19/15 16:40	1
Toluene-d8 (Surr)	22	X	50 <sub>-</sub> 130				01/16/15 16:18	01/19/15 16:40	1
4-Bromofluorobenzene	30	X	57 - 140				01/16/15 16:18	01/19/15 16:40	1
Method: 6010B - Metals (ICP) - TCL	P								
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fa
Arsenic	0.507		0.100	0,0328	mg/L		01/20/15 13:48	01/21/15 12:05	
Barium	0.309	В	0.200	0.0220	mg/L		01/20/15 13:48	01/21/15 12:05	
Cadmium	0.00800	J	0.0500	0.00350	mg/L		01/20/15 13:48	01/21/15 12:05	
Chromium	0.0155	U	0.100	0.0155	mg/L		01/20/15 13:48	01/21/15 12:05	
Selenium	0.0417	U	0.400	0.0417	mg/L		01/20/15 13:48	01/21/15 12:05	
Silver	0.0125	U	0.100	0.0125	mg/L		01/20/15 13:48	01/21/15 12:05	
Method: 6010B - Metals (ICP) - TCL	P - DL								
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fa
Lead	0.145	U	0.500	0.145	mg/L		01/20/15 13:48	01/21/15 16:14	
Method: 7470A - Mercury (CVAA) -	TCLP								
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fa
				0.0000820					

Client Sample ID: Bloom Composite Media - Plant 6 Location

Lab Sample ID: 600-105226-3

Date Collected: 01/16/15 13:47 Date Received: 01/16/15 15:51

Matrix: Solid

Method: 8260B - Volatile Organic Compounds (GC/MS)									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.00630	U	0.0500	0.00630	mg/Kg			01/17/15 16:19	10
Ethylbenzene	0.0102	U	0.0500	0.0102	mg/Kg			01/17/15 16:19	10
Toluene	0.0235	J	0.0500	0.0138	mg/Kg			01/17/15 16:19	10
Xylenes, Total	0.0113	U	0.0500	0.0113	mg/Kg			01/17/15 16:19	10

# **Client Sample Results**

Client: VLS Recovery Services

Project/Site: Bloom Energy Scrubber Media Sampling

TestAmerica Job ID: 600-105226-1

Client Sample ID: Bloom Composite Media - Plant 6 Location

Lab Sample ID: 600-105226-3 Date Collected: 01/16/15 13:47

Date Received: 01/16/15 15:51

Matrix: Solid

Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	80	-	61 - 130					01/17/15 16:19	10
Dibromofluoromethane	89		68 - 140					01/17/15 16:19	10
Toluene-d8 (Surr)	130		50 - 130					01/17/15 16:19	10
4-Bromofluorobenzene	174	X*	57 - 140					01/17/15 16:19	10
Method: 6010B - Metals (ICP)	- TCLP								
Analyte		Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0328	Ū	0.100	0.0328	mg/L		01/20/15 13:48	01/21/15 12:07	
Barium	0.338	В	0.200	0.0220	mg/L		01/20/15 13:48	01/21/15 12:07	1
Cadmium	0.00350	U	0.0500	0.00350	mg/L		01/20/15 13:48	01/21/15 12:07	1
Chromium	0.0155	U	0.100	0.0155	mg/L		01/20/15 13:48	01/21/15 12:07	1
Selenium	0.0417	U	0.400	0.0417	mg/L		01/20/15 13:48	01/21/15 12:07	1
Silver	0.0125	U	0.100	0.0125	mg/L		01/20/15 13:48	01/21/15 12:07	1
Method: 6010B - Metals (ICP)	- TCLP - DL								
Analyte		Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	0.145	Ū	0,500	0.145	mg/L		01/20/15 13:48	01/21/15 16:16	5
Method: 7470A - Mercury (CV	AA) - TCLP								
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0000820	U	0.000200	0.0000820	mg/L		01/20/15 13:00	01/20/15 17:00	1

# Client Sample ID: Bloom Composite Media - J.P. Morgan

Location

Date Collected: 01/16/15 13:52

Date Received: 01/16/15 15:51

Lab Sample ID: 600-105226-4

Matrix: Solid

Method: 8260B - Volatile Organic Compounds (GC/MS)									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethylbenzene	0.0759		0.0500	0.0102	mg/Kg			01/17/15 16:44	10
Toluene	1.10		0.0500	0.0138	mg/Kg			01/17/15 16:44	10
Xylenes, Total	0.0307	J	0.0500	0.0113	mg/Kg			01/17/15 16:44	10

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	83		61 - 130	01/16/15 16:18	01/19/15 14:12	1
Dibromofluoromethane	90		68 - 140	01/16/15 16:18	01/19/15 14:12	1
Toluene-d8 (Surr)	42	X	50 - 130	01/16/15 16:18	01/19/15 14:12	1
4-Bromofluorobenzene	25	X*	57 - 140	01/16/15 16:18	01/19/15 14:12	1
1,2-Dichloroethane-d4 (Surr)	82		61 - 130		01/17/15 16:44	10
Dibromofluoromethane	94		68 - 140		01/17/15 16:44	10
Toluene-d8 (Surr)	123		50 - 130		01/17/15 16:44	10
4-Bromofluorobenzene	172	X*	57 - 140		01/17/15 16:44	10

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	227		6.25	0.788	mg/Kg		01/16/15 16:18	01/19/15 17:04	10
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	79		61 - 130				01/16/15 16:18	01/19/15 17:04	10
Dibromofluoromethane	82		68 _ 140				01/16/15 16:18	01/19/15 17:04	10
Toluene-d8 (Surr)	31	X	50 <sub>-</sub> 130				01/16/15 16:18	01/19/15 17:04	10

Project/Site: Bloom Energy Scrubber Media Sampling

Client Sample ID: Bloom Composite Media - J.P. Morgan

Location

Date Collected: 01/16/15 13:52

Date Received: 01/16/15 15:51

Lab Sample ID: 600-105226-4

Matrix: Solid

Method: 8260B - Volatile	Organic (	Compounds	(GC/MS) - DL	(Continued)
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Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene	28	*X	57 - 140	01/16/15 16:18	01/19/15 17:04	10

4-Bromofluorobenzene	28	*X	57 - 140				01/16/15 16:18	01/19/15 17:04	10
Method: 6010B - Metals (ICP)	) - TCLP								
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0328	U	0.100	0.0328	mg/L		01/20/15 13:48	01/21/15 12:10	1
Barium	0.113	JB	0.200	0.0220	mg/L		01/20/15 13:48	01/21/15 12:10	1
Cadmium	0.00350	U	0.0500	0.00350	mg/L		01/20/15 13:48	01/21/15 12:10	1
Chromium	0.0155	U	0.100	0.0155	mg/L		01/20/15 13:48	01/21/15 12:10	1
Lead	0.0290	U	0.100	0.0290	mg/L		01/20/15 13:48	01/21/15 12:10	1
Selenium	0.0417	U	0.400	0.0417	mg/L		01/20/15 13:48	01/21/15 12:10	1
Silver	0.0125	υ	0.100	0.0125	mg/L		01/20/15 13:48	01/21/15 12:10	1
Method: 7470A - Mercury (CV	/AA) - TCLP								
Analyte	A CONTRACTOR OF THE CONTRACTOR	Qualifier	RI	MDI	Unit	ם	Prepared	Analyzed	Dil Fac

Method: 7470A - Mercury (CVAA) -	TCLP								
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0000820	Ū	0.000200	0.0000820	mg/L		01/20/15 13:00	01/20/15 17:01	1

Project/Site: Bloom Energy Scrubber Media Sampling

TestAmerica Job ID: 600-105226-1

# Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 600-153940/6

Matrix: Solid

Analysis Batch: 153940

Client Sample ID: Method Blank Prep Type: Total/NA

	МВ	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.000630	U	0.00500	0.000630	mg/Kg			01/17/15 12:06	1
Ethylbenzene	0.00102	U	0.00500	0.00102	mg/Kg			01/17/15 12:06	1
Toluene	0.00138	Ü	0.00500	0.00138	mg/Kg			01/17/15 12:06	1
Xylenes, Total	0.00113	U	0.00500	0.00113	mg/Kg			01/17/15 12:06	1

	MB MB				
Surrogate %Recove	ery Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	98	61 - 130	4	01/17/15 12:06	1
Dibromofluoromethane	91	68 - 140		01/17/15 12:06	1
Toluene-d8 (Surr)	98	50 <sub>-</sub> 130		01/17/15 12:06	1
4-Bromofluorobenzene	13	57 - 140		01/17/15 12:06	1

Lab Sample ID: LCS 600-153940/3

Matrix: Solid

Analysis Batch: 153940

Client Sample ID: Lab Control Sample Prep Type: Total/NA

	Spike	LCS	LCS				%Rec.	
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	
Benzene	0.0500	0.04579		mg/Kg		92	70 _ 131	
Ethylbenzene	0.0500	0.04984		mg/Kg		100	66 _ 130	
Toluene	0.0500	0.05074		mg/Kg		101	67 - 130	
Xylenes, Total	0.100	0.09896		mg/Kg		99	63 - 130	

	LCS	LCS	
Surrogate	%Recovery	Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	76		61 - 130
Dibromofluoromethane	88		68 - 140
Toluene-d8 (Surr)	91		50 - 130
4-Bromofluorobenzene	84		57 <sub>-</sub> 140

Lab Sample ID: LCSD 600-153940/4

**Matrix: Solid** 

Analysis Batch: 153940

Client Sample ID: Lab Control Sample Dup Prep Type: Total/NA

LCSD LCSD RPD Spike %Rec. Result Qualifier Analyte Added Unit %Rec Limits **RPD** Limit Benzene 0.0500 0.04810 mg/Kg 96 70 - 131 5 30 Ethylbenzene 0.0500 0.04853 mg/Kg 97 66 - 130 30 Toluene 0.0500 0.05051 mg/Kg 101 67 - 130 0 30 0.09778 63 - 130 30 Xylenes, Total 0.100 mg/Kg

	LCSD	LCSD	
Surrogate	%Recovery	Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	75		61 - 130
Dibromofluoromethane	82		68 - 140
Toluene-d8 (Surr)	81		50 - 130
4-Bromofluorobenzene	85		57 - 140

Project/Site: Bloom Energy Scrubber Media Sampling

TestAmerica Job ID: 600-105226-1

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 600-154124/1-A

Matrix: Solid

Analysis Batch: 154214

Client Sample ID: Method Blank Prep Type: Total/NA

Prep Batch: 154124

	MB	MB							
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.00328	U	0.0100	0.00328	mg/L		01/20/15 13:48	01/21/15 11:22	1
Barium	0,00220	U	0.0200	0.00220	mg/L		01/20/15 13:48	01/21/15 11:22	1
Cadmium	0.000350	U	0.00500	0.000350	mg/L		01/20/15 13:48	01/21/15 11:22	1
Chromium	0.00155	U	0.0100	0.00155	mg/L		01/20/15 13:48	01/21/15 11:22	1
Lead	0.00290	U	0.0100	0.00290	mg/L		01/20/15 13:48	01/21/15 11:22	1
Selenium	0.00417	U	0.0400	0.00417	mg/L		01/20/15 13:48	01/21/15 11:22	1
Silver	0.00125	U	0.0100	0.00125	mg/L		01/20/15 13:48	01/21/15 11:22	1

LCS LCS

Lab Sample ID: LCS 600-154124/2-A

**Matrix: Solid** 

Analysis Batch: 154214

Client Sample ID: Lab Control Sample

Prep Type: Total/NA Prep Batch: 154124

%Rec. Limits 80 - 120 80 - 120

Analyte Added Result Qualifier Unit %Rec Arsenic 1,00 1.042 mg/L 104 Barium 1.00 1.030 103 mg/L Cadmium 0.500 0.5214 mg/L 104 80 - 120 Chromium 1.00 1.028 mg/L 103 80 - 120 Lead 1.00 1.029 mg/L 103 80 - 120 Selenium 1.00 1.041 mg/L 104 80 - 120 Silver 0.500 0.5246 mg/L 105 80 - 120

Spike

Lab Sample ID: LB 600-154045/1-B

**Matrix: Solid** 

Analysis Batch: 154214

Client Sample ID: Method Blank

**Prep Type: TCLP** 

Prep Batch: 154124

		LB	LB							
	Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Arsenic	0.0328	U	0.100	0.0328	mg/L		01/20/15 13:48	01/21/15 11:55	1
Ì	Barium	0.1130	J	0.200	0.0220	mg/L		01/20/15 13:48	01/21/15 11:55	1
1	Cadmium	0.00350	υ	0.0500	0.00350	mg/L		01/20/15 13:48	01/21/15 11:55	1
ı	Chromium	0.0155	U	0.100	0.0155	mg/L		01/20/15 13:48	01/21/15 11:55	1
١	Lead	0.0290	U	0.100	0.0290	mg/L		01/20/15 13:48	01/21/15 11:55	1
ı	Selenium	0.0417	υ	0.400	0.0417	mg/L		01/20/15 13:48	01/21/15 11:55	1
1	Silver	0.0125	U	0.100	0.0125	mg/L		01/20/15 13:48	01/21/15 11:55	1

Lab Sample ID: 600-105226-1 MS

Matrix: Solid

Analysis Batch: 154214

Client Sample ID: Bloom Composite Media - Red Lion Location

Prep Type: TCLP

Prep Batch: 154124

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier %Rec Limits Unit Arsenic 0.350 10.0 11.08 mg/L 107 75 - 125

Barium 0.305 B 10.0 10.62 mg/L 103 75 - 125 Cadmium 0.00350 U 5.00 5.336 mg/L 107 75 - 125 Chromium 0.0155 U 10.14 75 - 125 10.0 mg/L 101 Selenium 0.0417 U 10.0 10.90 mg/L 109 75 - 125 Silver 0.0125 U 5.00 5.350 mg/L 75 - 125

Project/Site: Bloom Energy Scrubber Media Sampling

TestAmerica Job ID: 600-105226-1

Method: 6010B	- Metals (IC	CP) (Continued)
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Lab Sample ID: 600-105226-1 DU

Matrix: Solid

Client Sample ID: Bloom Composite Media - Red Lion Location

Prep Type: TCLP

	Analysis Batch: 154214							Prep Batch:	154124
		Sample	Sample	DU	DU				RPD
	Analyte	Result	Qualifler	Result	Qualifler	Unit	D	RPD	Limit
	Arsenic	0.350		0.2980	1	mg/L		16	20
١	Barium	0.305	В	0.2600		mg/L		16	20
	Cadmium	0.00350	U	0.00350	U	mg/L		NC	20
	Chromium	0.0155	U	0.0155	U	mg/L		NC	20
١	Selenium	0.0417	U	0.0417	U	mg/L		NC	20
	Silver	0.0125	U	0.0125	U	mg/L		NC	20
1									

Method: 6010B - Metals (ICP) - DL

Lab Sample ID: 600-105226-1 MS

**Matrix: Solid** 

Analysis Batch: 154214

Client Sample ID: Bloom Composite Media - Red Lion Location

**Prep Type: TCLP** 

**Prep Batch: 154124** 

Sample Sample Spike MS MS %Rec. Analyte Result Qualifier Added Result Qualifier Unit %Rec Limits Lead - DL 0.145 U 10.0 10.37 mg/L 104 75 - 125

Lab Sample ID: 600-105226-1 DU

**Matrix: Solid** 

Analysis Batch: 154214

Client Sample ID: Bloom Composite Media - Red Lion Location **Prep Type: TCLP** 

**Prep Batch: 154124** 

Sample Sample DU DU Analyte Result Qualifier Result Qualifier Unit Limit 0.145 U Lead - DL 0.145 U mg/L 20

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 600-154140/7-A

Matrix: Solid

Analysis Batch: 154148

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 154140

Analyte Result Qualifier MDL Unit Prepared Analyzed Dil Fac Mercury 0.0000820 U 0.000200 0.0000820 mg/L 01/20/15 13:00 01/20/15 16:46

Lab Sample ID: LCS 600-154140/8-A

Matrix: Solid

Analysis Batch: 154148

Client Sample ID: Lab Control Sample Prep Type: Total/NA

> Prep Batch: 154140 %Rec.

LCS LCS Spike Added Result Qualifier Analyte Unit %Rec Limits Mercury 0.00300 0.002974 ma/L 70 - 130

Lab Sample ID: LB 600-154045/1-C

Matrix: Solid

Analysis Batch: 154148

Client Sample ID: Method Blank

**Prep Type: TCLP** Prep Batch: 154140

LB LB

MB MB

Analyte Result Qualifier MDL Unit Prepared Analyzed Dil Fac Mercury 0.0000820 U 0.000200 0.0000820 mg/L 01/20/15 13:00 01/20/15 16:50

						riep batcii. i		
Spike	MS	MS				%Rec.		
Added	Result	Qualifier	Unit	D	%Rec	Limits		

 Analyte
 Result
 Qualifier
 Added
 Result
 Qualifier
 Unit
 D
 %Rec
 Limits

 Mercury
 0.0000820
 U
 0.00300
 0.003393
 mg/L
 113
 75 - 125

Sample Sample

Lab Sample ID: 600-105226-1 DU Client Sample ID: Bloom Composite Media - Red Lion Location

Matrix: Solid

Analysis Batch: 154148

**Matrix: Solid** 

Analysis Batch: 154148

Lab Sample ID: 600-105226-1 MS

Prep Type: TCLP

Prep Batch: 154140

 Sample
 DU
 RPD

 Analyte
 Result
 Qualifier
 Result
 Qualifier
 Unit
 D
 RPD
 Limit

 Mercury
 0.0000820
 U
 0.0000820
 U
 mg/L
 NC
 20

# Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Solid Prep Type: Total/NA

				Percent Sur	rogate Recovery (	(Acceptance Limits)
		12DCE	DBFM	TOL	BFB	
b Sample ID	Client Sample ID	(61-130)	(68-140)	(50-130)	(57-140)	
0-105226-1	Bloom Composite Media - Red Lion	80	92	127	153 X *	
0-105226-1	Bloom Composite Media - Red	68	62 X	22 X	7 X	
	Lion Location					
0-105226-1 - DL	Bloom Composite Media - Red	75	93	20 X	28 X	
	Lion Location					
0-105226-2	Bloom Composite Media -	84	94	115	159 X	
	Brookside Location					
0-105226-2	Bloom Composite Media -	81	80	29 X	32 X	
	Brookside Location					
-105226-2 - DL	Bloom Composite Media -	88	79	22 X	30 X	
	Brookside Location					
-105226-3	Bloom Composite Media - Plant	80	89	130	174 X *	
	6 Location					
-105226-4	Bloom Composite Media - J.P.	82	94	123	172 X *	
	Morgan Location					
-105226-4	Bloom Composite Media - J.P.	83	90	42 X	25 X *	
	Morgan Location					
)-105226-4 - DL	Bloom Composite Media - J.P.	79	82	31 X	28 * X	
	Morgan Location			-	527 TO	
600-153940/3	Lab Control Sample	76	88	91	84	
D 600-153940/4	Lab Control Sample Dup	75	82	81	85	
600-153940/6	Method Blank	98	91	98	113	
Surrogate Legend						

12DCE = 1,2-Dichloroethane-d4 (Surr)

DBFM = Dibromofluoromethane

TOL = Toluene-d8 (Surr)

BFB = 4-Bromofluorobenzene

Project/Site: Bloom Energy Scrubber Media Sampling

# GC/MS VOA

# **Prep Batch: 153897**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-105226-1	Bloom Composite Media - Red Lion Location	Total/NA	Solid	5030B	
600-105226-1 - DL	Bloom Composite Media - Red Lion Location	Total/NA	Solid	5030B	
600-105226-2 - DL	Bloom Composite Media - Brookside Location	Total/NA	Solid	5030B	
600-105226-2	Bloom Composite Media - Brookside Location	Total/NA	Solid	5030B	
600-105226-4 - DL	Bloom Composite Media - J.P. Morgan Location	Total/NA	Solid	5030B	
600-105226-4	Bloom Composite Media - J.P. Morgan Location	Total/NA	Solid	5030B	

# Analysis Batch: 153940

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-105226-1	Bloom Composite Media - Red Lion Location	Total/NA	Solid	8260B	- 30
600-105226-2	Bloom Composite Media - Brookside Location	Total/NA	Solid	8260B	
600-105226-3	Bloom Composite Media - Plant 6 Location	Total/NA	Solid	8260B	
600-105226-4	Bloom Composite Media - J.P. Morgan Location	Total/NA	Solid	8260B	
LCS 600-153940/3	Lab Control Sample	Total/NA	Solid	8260B	
LCSD 600-153940/4	Lab Control Sample Dup	Total/NA	Solid	8260B	
MB 600-153940/6	Method Blank	Total/NA	Solid	8260B	

# Analysis Batch: 153955

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-105226-1	Bloom Composite Media - Red Lion Location	Total/NA	Solid	8260B	153897
600-105226-1 - DL	Bloom Composite Media - Red Lion Location	Total/NA	Solid	8260B	153897
600-105226-2	Bloom Composite Media - Brookside Location	Total/NA	Solid	8260B	153897
600-105226-2 - DL	Bloom Composite Media - Brookside Location	Total/NA	Solid	8260B	153897
600-105226-4	Bloom Composite Media - J.P. Morgan Location	Total/NA	Solid	8260B	153897
600-105226-4 - DL	Bloom Composite Media - J.P. Morgan Location	Total/NA	Solid	8260B	153897

# Metals

# Leach Batch: 154045

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-105226-1	Bloom Composite Media - Red Lion Location	TCLP	Solid	1311	-15
600-105226-1 - DL	Bloom Composite Media - Red Lion Location	TCLP	Solid	1311	
600-105226-1 DU	Bloom Composite Media - Red Lion Location	TCLP	Solid	1311	
600-105226-1 DU - DL	Bloom Composite Media - Red Lion Location	TCLP	Solid	1311	
600-105226-1 MS	Bloom Composite Media - Red Lion Location	TCLP	Solid	1311	
600-105226-1 MS - DL	Bloom Composite Media - Red Lion Location	TCLP	Solid	1311	
600-105226-2	Bloom Composite Media - Brookside Location	TCLP	Solid	1311	
600-105226-2 - DL	Bloom Composite Media - Brookside Location	TCLP	Solid	1311	
600-105226-3	Bloom Composite Media - Plant 6 Location	TCLP	Solid	1311	
600-105226-3 - DL	Bloom Composite Media - Plant 6 Location	TCLP	Solid	1311	
600-105226-4	Bloom Composite Media - J.P. Morgan Location	TCLP	Solid	1311	
LB 600-154045/1-B	Method Blank	TCLP	Solid	1311	
LB 600-154045/1-C	Method Blank	TCLP	Solid	1311	

# Prep Batch: 154124

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-105226-1	Bloom Composite Media - Red Lion Location	TCLP	Solid	3010A	154045
600-105226-1 - DL	Bloom Composite Media - Red Lion Location	TCLP	Solid	3010A	154045
600-105226-1 DU - DL	Bloom Composite Media - Red Lion Location	TCLP	Solid	3010A	154045
600-105226-1 DU	Bloom Composite Media - Red Lion Location	TCLP	Solid	3010A	154045

# Prep Batch: 154124 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-105226-1 MS - DL	Bloom Composite Media - Red Lion Location	led Lion Location TCLP	Solid	3010A	154045
600-105226-1 MS	Bloom Composite Media - Red Lion Location	TCLP	Solid	3010A	154045
600-105226-2 - DL	Bloom Composite Media - Brookside Location	TCLP	Solid	3010A	154045
600-105226-2	Bloom Composite Media - Brookside Location	TCLP	Solid	3010A	154045
600-105226-3	Bloom Composite Media - Plant 6 Location	TCLP	Solid	3010A	154045
600-105226-3 - DL	Bloom Composite Media - Plant 6 Location	TCLP	Solid	3010A	154045
600-105226-4	Bloom Composite Media - J.P. Morgan Location	TCLP	Solid	3010A	154045
LB 600-154045/1-B	Method Blank	TCLP	Solid	3010A	154045
LCS 600-154124/2-A	Lab Control Sample	Total/NA	Solid	3010A	
MB 600-154124/1-A	Method Blank	Total/NA	Solid	3010A	

# **Prep Batch: 154140**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-105226-1	Bloom Composite Media - Red Lion Location	TCLP	Solid	7470A	154045
600-105226-1 DU	Bloom Composite Media - Red Lion Location	TCLP	Solid	7470A	154045
600-105226-1 MS	Bloom Composite Media - Red Lion Location	TCLP	Solid	7470A	154045
600-105226-2	Bloom Composite Media - Brookside Location	TCLP	Solid	7470A	154045
600-105226-3	Bloom Composite Media - Plant 6 Location	TCLP	Solid	7470A	154045
600-105226-4	Bloom Composite Media - J.P. Morgan Location	TCLP	Solid	7470A	154045
LB 600-154045/1-C	Method Blank	TCLP	Solid	7470A	154045
LCS 600-154140/8-A	Lab Control Sample	Total/NA	Solid	7470A	
MB 600-154140/7-A	Method Blank	Total/NA	Solid	7470A	

# Analysis Batch: 154148

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-105226-1	Bloom Composite Media - Red Lion Location	TCLP	Solid	7470A	154140
600-105226-1 DU	Bloom Composite Media - Red Lion Location	TCLP	Solid	7470A	154140
600-105226-1 MS	Bloom Composite Media - Red Lion Location	TCLP	Solid	7470A	154140
600-105226-2	Bloom Composite Media - Brookside Location	TCLP	Solid	7470A	154140
600-105226-3	Bloom Composite Media - Plant 6 Location	TCLP	Solid	7470A	154140
600-105226-4	Bloom Composite Media - J.P. Morgan Location	TCLP	Solid	7470A	154140
LB 600-154045/1-C	Method Blank	TCLP	Solid	7470A	154140
LCS 600-154140/8-A	Lab Control Sample	Total/NA	Solid	7470A	154140
MB 600-154140/7-A	Method Blank	Total/NA	Solid	7470A	154140

# Analysis Batch: 154214

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-105226-1	Bloom Composite Media - Red Lion Location	TCLP	Solid	6010B	154124
600-105226-1 - DL	Bloom Composite Media - Red Lion Location	TCLP	Solid	6010B	154124
600-105226-1 DU	Bloom Composite Media - Red Lion Location	TCLP	Solid	6010B	154124
600-105226-1 DU - DL	Bloom Composite Media - Red Lion Location	TCLP	Solid	6010B	154124
600-105226-1 MS	Bloom Composite Media - Red Lion Location	TCLP	Solid	6010B	154124
600-105226-1 MS - DL	Bloom Composite Media - Red Lion Location	TCLP	Solid	6010B	154124
600-105226-2	Bloom Composite Media - Brookside Location	TCLP	Solid	6010B	154124
600-105226-2 - DL	Bloom Composite Media - Brookside Location	TCLP	Solid	6010B	154124
600-105226-3	Bloom Composite Media - Plant 6 Location	TCLP	Solid	6010B	154124
600-105226-3 - DL	Bloom Composite Media - Plant 6 Location	TCLP	Solid	6010B	154124
600-105226-4	Bloom Composite Media - J.P. Morgan Location	TCLP	Solid	6010B	154124
LB 600-154045/1-B	Method Blank	TCLP	Solid	6010B	154124
LCS 600-154124/2-A	Lab Control Sample	Total/NA	Solid	6010B	154124
MB 600-154124/1-A	Method Blank	Total/NA	Solid	6010B	154124

TestAmerica Houston

9

Client Sample ID: Bloom Composite Media - Red Lion

Date Collected: 01/16/15 13:35 Date Received: 01/16/15 15:51

Matrix: Solid

	Batch	Batch		Dil	Initial	Final	Batch	Prepared		
Ргер Туре	Type	Method	Run	Factor	Amount	Amount	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			4 g	10 mL	153897	01/16/15 16:18	WS1	TAL HOU
Total/NA	Analysis	8260B		1	4 g	10 mL	153955	01/19/15 13:22	WS1	TAL HOU
Total/NA	Prep	5030B	DL		4 g	10 mL	153897	01/16/15 16:18	WS1	TAL HOU
Total/NA	Analysis	8260B	DL	20	4 g	10 mL	153955	01/19/15 16:16	WS1	TAL HOU
Total/NA	Analysis	8260B		10	5 g	5 g	153940	01/17/15 15:30	WS1	TAL HOU
TCLP	Leach	1311			1.0 g	1.0 mL	154045	01/19/15 21:07	RT1	TAL HOU
TCLP	Prep	3010A			5 mL	50 mL	154124	01/20/15 13:48	NER	TAL HOU
TCLP	Analysis	6010B		1	5 mL	50 mL	154214	01/21/15 11:57	DCL	TAL HOU
TCLP	Leach	1311	DL		1.0 g	1.0 mL	154045	01/19/15 21:07	RT1	TAL HOU
TCLP	Prep	3010A	DL		5 mL	50 mL	154124	01/20/15 13:48	NER	TAL HOU
TCLP	Analysis	6010B	DL	5	5 mL	50 mL	154214	01/21/15 16:07	DCL	TAL HOU
TCLP	Leach	1311			1.0 g	1.0 mL	154045	01/19/15 21:07	RT1	TAL HOU
TCLP	Prep	7470A			40 mL	40 mL	154140	01/20/15 13:00	TWR	TAL HOU
TCLP	Analysis	7470A		1	40 mL	40 mL	154148	01/20/15 16:52	TWR	TAL HOU

Client Sample ID: Bloom Composite Media - Brookside

Batch

Location

TCLP

TCLP

TCLP

Date Collected: 01/16/15 13:41 Date Received: 01/16/15 15:51

Batch

Leach

Analysis

Ргер

Matrix: Solid

Lab Sample ID: 600-105226-2

Prepared

01/19/15 21:07

01/20/15 13:00

01/20/15 16:58

**Prep Type** Type Method Run Factor Amount Amount Number or Analyzed Analyst Lab Prep Total/NA 5030B 10 mL 153897 01/16/15 16:18 WS1 TAL HOU 4 g Total/NA 8260B 153955 TAL HOU Analysis 4 g 10 mL 01/19/15 13:47 WS1 Total/NA 5030B DL 10 mL 153897 01/16/15 16:18 WS1 TAL HOU Prep 4 g Total/NA 8260B DL 10 mL 153955 01/19/15 16:40 WS1 TAL HOU Analysis 10 4 g Total/NA 8260B 153940 01/17/15 15:54 WS1 TAL HOU Analysis 10 5 g 5 g TCLP Leach 1311 1.0 g 1.0 mL 154045 01/19/15 21:07 RT1 TAL HOU TCLP Prep 3010A 5 mL 50 mL 154124 01/20/15 13:48 NER TAL HOU TCLP Analysis 6010B 5 mL 50 mL 154214 01/21/15 12:05 DCL TAL HOU TCLP Leach 1311 DL 1.0 g 1.0 mL 154045 01/19/15 21:07 RT1 TAL HOU TCLP Ргер 3010A DL 5 mL 50 mL 154124 01/20/15 13:48 NER TAL HOU DL TCLP 6010B 5 mL 50 mL 154214 01/21/15 16:14 DCL TAL HOU Analysis

1.0 g

40 mL

40 mL

Initial

**Final** 

1.0 mL

40 mL

40 mL

Batch

154045

154140

154148

Dil

Client Sample ID: Bloom Composite Media - Plant 6 Location

1311

7470A

7470A

Date Collected: 01/16/15 13:47

Lab Sample ID: 600-105226-3

RT1

**TWR** 

TWR

Matrix: Solid

TAL HOU

TAL HOU

TAL HOU

Date Received: 01/16/15 15:51

		Batch	Batch		Dil	Initial	Final	Batch	Prepared		
	Prep Type	Type	Method	Run	Factor	Amount	Amount	Number	or Analyzed	Analyst	Lab
Į	Total/NA	Analysis	8260B		10	5 g	5 g	153940	01/17/15 16:19	WS1	TAL HOU

TestAmerica Job ID: 600-105226-1

# Client Sample ID: Bloom Composite Media - Plant 6 Location

Date Collected: 01/16/15 13:47 Date Received: 01/16/15 15:51

Lab Sample ID: 600-105226-3 Matrix: Solid

	Batch	Batch		Dil	Initial	Final	Batch	Prepared		
Ргер Туре	Туре	Method	Run	Factor	Amount	Amount	Number	or Analyzed	Analyst	Lab
TCLP	Leach	1311			1.0 g	1.0 mL	154045	01/19/15 21:07	RT1	TAL HOU
TCLP	Prep	3010A			5 mL	50 mL	154124	01/20/15 13:48	NER	TAL HOU
TCLP	Analysis	6010B		1	5 mL	50 mL	154214	01/21/15 12:07	DCL	TAL HOU
TCLP	Leach	1311	DL		1.0 g	1.0 mL	154045	01/19/15 21:07	RT1	TAL HOU
TCLP	Prep	3010A	DL		5 mL	50 mL	154124	01/20/15 13:48	NER	TAL HOU
TCLP	Analysis	6010B	DL	5	5 mL	50 mL	154214	01/21/15 16:16	DCL	TAL HOU
TCLP	Leach	1311			1.0 g	1.0 mL	154045	01/19/15 21:07	RT1	TAL HOU
TCLP	Prep	7470A			40 mL	40 mL	154140	01/20/15 13:00	TWR	TAL HOU
TCLP	Analysis	7470A		1	40 mL	40 mL	154148	01/20/15 17:00	TWR	TAL HOU

Client Sample ID: Bloom Composite Media - J.P. Morgan

Location

Date Collected: 01/16/15 13:52

Date Received: 01/16/15 15:51

Lab Sample ID: 600-105226-4

Matrix: Solid

	Batch	Batch		Dil	Initial	Final	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Amount	Amount	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			4 g	10 mL	153897	01/16/15 16:18	WS1	TAL HOU
Total/NA	Analysis	8260B		1	4 g	10 mL	153955	01/19/15 14:12	WS1	TAL HOU
Total/NA	Prep	5030B	DL		4 g	10 mL	153897	01/16/15 16:18	WS1	TAL HOU
Total/NA	Analysis	8260B	DL	10	4 g	10 mL	153955	01/19/15 17:04	WS1	TAL HOU
Total/NA	Analysis	8260B		10	5 g	5 g	153940	01/17/15 16:44	WS1	TAL HOU
TCLP	Leach	1311			1.0 g	1.0 mL	154045	01/19/15 21:07	RT1	TAL HOU
TCLP	Ргер	3010A			5 mL	50 mL	154124	01/20/15 13:48	NER	TAL HOU
TCLP	Analysis	6010B		1	5 mL	50 mL	154214	01/21/15 12:10	DCL	TAL HOU
TCLP	Leach	1311			1.0 g	1.0 mL	154045	01/19/15 21:07	RT1	TAL HOU
TCLP	Prep	7470A			40 mL	40 mL	154140	01/20/15 13:00	TWR	TAL HOU
TCLP	Analysis	7470A		1	40 mL	40 mL	154148	01/20/15 17:01	TWR	TAL HOU

**Laboratory References:** 

TAL HOU = TestAmerica Houston, 6310 Rothway Street, Houston, TX 77040, TEL (713)690-4444

# **Certification Summary**

Client: VLS Recovery Services

Project/Site: Bloom Energy Scrubber Media Sampling

TestAmerica Job ID: 600-105226-1

# Laboratory: TestAmerica Houston

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program		<b>EPA Region</b>	Certification ID	<b>Expiration Date</b>
Texas	NELAP		6	T104704223	10-31-15
Analysis Method	Prep Method	Matrix	Analyt	te	

# **Method Summary**

Client: VLS Recovery Services

Project/Site: Bloom Energy Scrubber Media Sampling

TestAmerica Job ID: 600-105226-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL HOU
6010B	Metals (ICP)	SW846	TAL HOU
7470A	Mercury (CVAA)	SW846	TAL HOU

#### **Protocol References:**

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

### **Laboratory References:**

TAL HOU = TestAmerica Houston, 6310 Rothway Street, Houston, TX 77040, TEL (713)690-4444

Custody Seals Intact: Custody Seal No.;
Δ Yes Δ No

<b>TeetAmerica Houston</b> 6310 Rothway Street Houston, TX 77040 Phone (713) 690-4444 Fax (713) 690-5848				tody R		rd									70.00	TestAn	
Client Information	Sampler Q. C	1ZARE	-5	Rick	M: ie, Kris	у			5226 C	hain c	of Cus	li illili ili tody		1881		COC No 600-33572-11099,1	L.,
Client Contact. Quinten Cazares	Phone: 71 3 - 7	208-141	50	E-Ma krist	v.ricke	Mesta	_	ainc.co			τ.	150			- 1	Page: Page 1 of 1	
Company Contant	A LAPS COS				, <u>.</u>	3.002				- D-						Job ik	
VLS Recovery Services Address:	Due Date Requests	± //10	lin		- 12	П	-	T A	natyst	s Red	ueso	<del>PQ</del>	1.1	1	Н	Preservation Codes:	
17020 Premium Drive City:	TAT Brown stad (d)		115				- 1				1	1				A-HCL N	- Hexane
Hockley	TAT Requested (di	10 Da	75		展		-				1 1	1					- None - AsNaO2
State, Zip: TX, 77447	7 1.	24 ho	re 1				- 1			1	1 1	-1			1	D - Nitric Acid P	- Na2O4S - Na2SO3
Phone: 936-372-0464	PO#: Purchase Order	-			TOTAL PROPERTY.											F-MeOH R G-Amchlor S	- Na262603 - H2SO4
	WO#	nat roquiro			PASSET NAYS						Н	1			=	1-los U	-TSP Dodecahydrate -Actione
Quinten.Cazares@visrs.com Project Name:	Davis et a					-	- 1				H	-1			g	J - DI Water V K - EDTA V	-MCAA /-ph4-5
Dry Fither Media	Project # 60000431				3	474 A01	- 1	1					11		욹	L-EDA Z	- other (specify)
VL Bayport	SSOW#:					7108,7					П		П		New of padde longs	Other:	
Sample Identification	Semple Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (Wesseler, S-roads, O-westertill, ST-Timme, Arthr		TCL.P Metals (8610B, 7470A)	BTEX (8280B)								Total fumba		ructions/Note:
TO SEE STORY TO SEE			PARA	don Cyde.	XX	Na.		d ve		4 659	in't	Ø :	THE L	<b>*</b>	X		
Rloom Composite Milia - Red lion location	1/16/15	1335	C	Solid	П	X	X									Please Call	if samples
Bloom Comparte Meda - Brookede bases		1341	G	Solid		1	K									Results w	ill be
Bloom Conside Meds - Plant 6 location	1/16/15	1247	G	Solid		X	X									Results a	whe then
Bloom Camposite major - J. P. Mangow lowse	W 1/16/15	1352	G	Solid	П	X	V									1/20)15	
						1.731											
	(/ 14/13			Solid	Ħ		1				П						
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Poșsible Hazard Identification			dialognal	Solid Solid	Sa	mple	•			y be a	\$500SS	ed If sa	amples to	are retu	ninec	d longer than 1 ma	CHILDRE
Poșcible Hazard Identification	isan B Unknor		diological	Solid Solid		mple i	tum T	o Clien		A	isposa	ed If sa	amples of	are retu	ninec	d longer than 1 ma e For A	nth) Konths
Poesible Hazard Identification Polon-Hazard Planmable Skin Initant Po			diological	Solid Solid		mple i	tum T	o Clien	t	A	isposa nts:	l By La	imples b	¬ <u>A</u> _	ninec	d longer than 1 ma e For A	CHILDRE
Possible Hazard Identification   Non-Hazard   Flammable   Skin Imitant   Positiverable Requested: I, II, III, IV, Other (specify)	isan B Unknow	en Ra		Solid Solid	Sp	mple i	tum T	o Clien tions/Q	t	A	isposa nts:	l By La	Shipmen	□ □ An	alnec	e For A	CHILDRE

Company



Cooler Temperature(s) \*C and Other Remarks:

Date/Time:

TestAmerica Houston

Loc: 600 105226 TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Sample Re

klist

			Date/Time Received				5 5
			Date/Time Received				
JOB NUMBER:			CLIENT:	erv	165		
JNPACKED BY:	CR1		CARRIER/DRIVER:	11.	·	a and a second	
JNPACKED BT:	VY		CARRIENDRIVER.	C-/ /	200		
Custody Seal Present:	YES	□ ио	Number of Coolers F	Received: _		Water Barrier	(6)
Cooler ID	Temp Blank	Trip Blank	Observed Temp (℃)	Therm	Them	Corrected Te	mp
GB	10/ N	Y 1/10	23.4	549	0.3	23.1	
	Y / N	Y / N					
	YIN	Y / N					
	Y/N	Y / N		6			
	Y / N	Y / N					
	Y / N	YIN					
	Y / N	Y / N					
	Y / N	Y / N					
	Y / N	Y / N					
Samples received on ice ABORATORY PRESE	RVATION OF		EQUIRED: IN		☐ YES	□ NO	
_ABORATORY PRESE Base samples are>pH 1 bH paper Lot # /OA headspace accepta	RVATION OF 2: YES [	SAMPLES RE NO - YES 1	Acid preserved are<	oH 2;	YES	□ NO	0
_ABORATORY PRESE Base samples are>pH 1 bH paper Lot #	RVATION OF 2: YES [	SAMPLES RE NO - YES 1	Acid preserved are<	oH 2;	YES	_	<u>o</u>
_ABORATORY PRESE Base samples are>pH 1 bH paper Lot # /OA headspace accepta	RVATION OF 2: YES [	SAMPLES RE NO - YES 1	Acid preserved are<	oH 2;	YES	_	°
ABORATORY PRESE Base samples are>pH 1 bH paper Lot #	RVATION OF 2: YES [ able (5-6mm): aboratory's stand	SAMPLES RE NO YES 1	Acid preserved are of NA	upon receipt	YES	_	0
ABORATORY PRESE Base samples are>pH 1 bH paper Lot #	RVATION OF 2: YES [ able (5-6mm): aboratory's stand	SAMPLES RE NO YES 1	Acid preserved are<	upon receipt	YES	_	o
ABORATORY PRESE Base samples are>pH 1 bH paper Lot #	RVATION OF 2: YES [ able (5-6mm): aboratory's stand	SAMPLES RE NO YES 1	Acid preserved are of NA	upon receipt	YES	_	0
ABORATORY PRESE Base samples are>pH 1  OH paper Lot #  /OA headspace accepta  Did samples meet the la	RVATION OF 2: YES [ able (5-6mm): aboratory's stand	SAMPLES RE NO  YES 1	Acid preserved are of NA  of sample acceptability  Samples	upon receipt	YES	YZS N	
ABORATORY PRESE Base samples are>pH 1 bH paper Lot #	RVATION OF 2: YES [ able (5-6mm): aboratory's stand	SAMPLES RE NO  YES 1	Acid preserved are of NA	upon receipt	YES	_	
ABORATORY PRESE Base samples are>pH 1 bH paper Lot #  /OA headspace accepta  Did samples meet the la  COMMENTS:  **EZGLI***  **HOUMANG M HEGGYET SHILL  **HOUMANG M HEGGYET SHILL	RVATION OF 2: YES [ able (5-6mm): aboratory's stand	SAMPLES RE NO  YES 1	Acid preserved are of NA  of sample acceptability  Samples	upon receipt	YES	YES N	meri
ABORATORY PRESE Base samples are>pH 1 bH paper Lot #	RVATION OF 2: YES [ able (5-6mm): aboratory's stand	SAMPLES RE NO  YES 1	Acid preserved are of NA  of sample acceptability  Samples	upon receipt	YES	YES N	meri

HS-SA-WI-013

Rev. 3; 07/01/2014

# **Login Sample Receipt Checklist**

Client: VLS Recovery Services

Job Number: 600-105226-1

SDG Number:

List Source: TestAmerica Houston

Login Number: 105226

List Number: 1

Creator: Crafton, Tommie S

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>N/A</td> <td>Lab does not accept radioactive samples.</td>	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	23.1 No ice on samples
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	á.
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	,
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	Check done at department level as required.



9441.1990(13a)

RCRA/Superfund/OUST Hotline Monthly Report Question

May 1990

 40 CFR Section 261.4(c) Hazardous Wastes Which Are Exempted From Certain Regulations

A petroleum refining facility, which generates more than 1000 kilograms of hazardous waste per month, operates a heat exchanger as part of the refining process. A sludge forms inside the heat exchanger. Periodically this sludge is cleaned out of the heat exchanger and managed as listed hazardous waste K050. According to 40 CFR Section 261.4(c) a hazardous waste generated in a manufacturing process unit is exempt from regulation until the waste exits the unit, or the waste remains in the unit more than 90 days after the unit ceases to be operated for manufacturing purposes. If the refining facility disconnects the heat exchanger and ships it off-site for cleaning within 90 days, would the exemption in Section 261.4(c) apply?

No, the 40 CFR 261.4(c) exemption is not available in this situation. Although the exemption is available for hazardous waste in transport vehicles or vessels, which may be moved to a central facility for cleaning (see 45 FR 72026, October 30, 1930), EPA does not interpret the exemption as applying to manufacturing process units, associated non-waste treatment units, or product/raw material storage tanks (that are stationary during operation) if those units are disassembled for cleaning off-site. As stated in the October 30, 1930, Federal Register (45 FR 72025), the incentive to maintain the unit's integrity to prevent leaks or unintended releases of products is substantially reduced when the unit is taken out of operation. Likewise, there would be loss of the unit's structural integrity if it were to be disassembled for off-site shipment, with a potential for hazardous waste releases. Thus the 40 CFR 261.4(c) exclusion is not available to manufacturing units, associated non-waste treatment units, and product/raw material storage tanks that are to be shipped off-site for cleaning.

# Heat Exchanger



